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ABSTRACT

This report reviews a summer school program in Daviess County, Kentucky in 1978. The program consisted of half-day sessions held for 20 days during June and July. Whether reading and mathematics achievement was significantly related to summer school attendance, and whether this relationship was different for boys and girls, was analyzed. The population consisted of approximately 900 first- through seventh-grade pupils invited to attend summer school. The sample consisted of those students who attended at least 14 of 20 days and on whom spring and summer CTBS (Comprehensive Test of Basic Skills) scores were available. The control group was randomly selected from pupils who turned down the invitation to attend. The data showed a significant increase in reading scores but not in mathematics scores. Only boys made any significant gains, and this was limited to reading. Overall, initial gains in reading were highest for first and second graders, with long-term comparisons indicating that summer school was most effective in mathematics at first-grade level and with girls. (MP)

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Evaluating a Summer School Program for Elementary Students Achieving Below Grade Average

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PREPS RESEARCH PROJECT

1978 - 79

The Daviess County School System
Owensboro, Kentucky

REPORT PREPARED BY:

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TITLE

Evaluating a Summer School Program for Elementary Students Achieving Below Grade Average.

INTRODUCTION

The Daviess County PREPS research project focused on evaluating their 1978 summer school program. The summer school consisted of half-day sessions held for a 20 day period of time during the months of June and July. Children were invited to attend summer school if they were at least one year behind their expected achievement level. The learning activities of the summer school were structured around specific behavioral objectives written prior to the program. The atmosphere of the program was informal; with small groups and daily treats. The emphasis of the program was on reading and mathematics.

The evaluation of the summer school program consisted of analyzing whether reading and mathematic achievement was significantly related to attendance in summer school and whether this relationship was different for boys and girls.

SPECIFIC RESEARCH QUESTIONS

1. Did students enrolled in the 1978 Daviess County summer school program significantly increase their reading and mathematics achievement scores between the spring and summer (1978) administration of the CTBS?
2. Did students enrolled in the 1978 Daviess County summer school program significantly increase their reading and mathematics achievement scores between the spring and summer (1978) administration of the CTBS when data were analyzed for each level of the CTBS administered?

3. Did boys and girls (as separate groups) enrolled in the Daviess County summer school program significantly increase their reading and mathematics achievement scores between the spring and summer (1978) administration of the CTBS?
4. Were the January 1979 reading and mathematic CTBS achievement scores significantly higher for students enrolled in the summer school program than for students who were invited but did not attend the program?
5. Were the January 1979 reading and mathematic CTBS achievement scores significantly higher for students enrolled in the summer school program than for students who were invited but did not attend when data were analyzed for each level of the test administered?
6. Were the January 1979 reading and mathematic CTBS achievement scores significantly higher for students enrolled in the summer school program than for students who were invited but did not attend when data were analyzed for boys and girls separately?

INSTRUMENTATION

The 1972-73 nationally normed Comprehensive Test of Basic Skills (CTBS) published by McGraw-Hill (1976) was used to collect academic achievement in reading and mathematics. Form S was administered to all students in spring of 1978. Form T was administered on the last day of the summer school to all summer school participants and in January 1979 to all students involved in this study. Five levels of the test were administered following the written recommendations of the publisher. The levels were:

Test Level	Grade Level of Student
A	1
B	2
1	3 and 4
2	5 and 6
3	7

The spring administration of the CTBS was scored by the Kentucky State Department of Education. The July and January administration of the CTBS were hand scored.

The academic aptitude of fourth through seventh grade students was measured with the Short Form Test of Academic Aptitude (SFTAA) published by McGraw-Hill (1976). This test was scored by the Kentucky State Department of Education.

POPULATION AND SAMPLING

The population of the study consisted of Daviess County students in the first through seventh grades during the 1977-78 school year who were invited to attend the summer school program (n = approximately 900). Students were invited to attend summer school if they scored in the lower three stanines in reading and/or mathematics on the Spring 1977-78 administration of the CTBS or if in their teachers' judgement they were functioning a year behind their classmates. The sample of summer school students used in this study consisted of those students who attended summer school at least 14 of the 20 days the program was in operation and on whom both spring and summer CTBS scores were available (n = 245 or approximately 27% of the population). The control group was a randomly selected sample of students who had been invited to attend the program but who did not attend (n = 58 or approximately 6% of the population).

DATA COLLECTION PROCEDURE

The summer school program consisted of 20 one-half day sessions held during June and July 1978. Students were invited to attend based on reading and mathematic scoring on the spring administration of the CTBS or on teacher recommendation. The summer school program differed from the regular school year program in that it was a half-day program, was less formal, had a lower student to teacher ratio, and served treats.

The CTBS had been administered to all Daviess County students during the spring of 1978. An alternate form of the CTBS was administered to summer school students on the final day of the summer school program and again in January 1979. The alternate form of the CTBS was also administered in January to the random sample of students invited but not attending the summer school.

ASSUMPTIONS AND LIMITATIONS

This study contrasted reading and mathematics CTBS achievement scores of students who attended summer school and students who were invited but did not attend summer school. The study assumed that those students who self selected summer school were no different from students who did not attend summer school. Comparison of the samples using pretest data showed groups to be similar in initial reading achievement, initial mathematics achievement and academic aptitude. Pretest scores were as follows:

	Summer School Students	Students Invited But Not Attending Summer School
Reading Pretest (stanine)	3.8	3.8
Mathematic Pretest (stanine)	4.2	4.1
Academic Aptitude	91.1	92.0

Boys comprised about two-thirds of the summer school sample and were approximately equally represented in the control sample (N-boys-ss = 164; N-girls-ss = 81; N-boys-not ss = 34; N-girls-not ss = 30).

FINDINGS

The findings were reported by specific research question. The first three research questions compared spring to summer achievement gain. The fourth through sixth research questions compared summer school students' January CTBS scores to the January CTBS scores of a randomly selected control group who were invited to attend summer school but who chose not to participate. The statistics used to test the first, third, fourth, and sixth research question use students' stanine scores. This metric was chosen to allow for grouping of data across levels of the test. The statistics used to test the second and fifth research questions were calculated on expanded scale scores which allowed a more sensitive treatment of the data within grade levels. All research questions contrasted achievement scores in both reading and mathematics. Statistical procedures that were significant at or below the .05 level are designated with an asterisk (*). Statistical procedures that were significant between the .10 and .05 level were designated with a cross (+).

Research Question One

Did students enrolled in the 1978 Daviess County summer school program significantly increase their reading and mathematics achievement scores between the spring and summer (1978) administration of the CTBS?

Correlated t-tests were calculated between spring and summer reading and mathematic stanine scores of students attending summer school. The following statistics were obtained:

Reading	Mathematics
* t = 2.53, significant at 0.012	t = 0.48, significant at 0.630
$\bar{X}$(sp) = 3.77, σ(sp) = 1.82	$\bar{X}$(sp) = 4.24, σ(sp) = 1.34
$\bar{X}$(su) = 3.93, σ(su) = 1.33	$\bar{X}$(su) = 4.27, σ(su) = 1.47
n = 232	n = 236

An increase in both reading and mathematic stanine scores was found when data for all students enrolled in the summer school program were grouped together. The reading increase was found to be statistically significant at the 0.012 level.

Research Question Two

Did students enrolled in the 1978 Daviess County summer school program significantly increase their reading and mathematics achievement scores between the spring and summer (1978) administration of the CTBS when data was analyzed for each level of the CTBS administered?

Correlated t-tests were calculated between spring and summer reading and mathematic expanded scale scores of students attending summer school for each level of the test administered. Table 1 reports the statistics.

In four of the five reading comparisons shown in Table 1 an increase was found between the group mean of the spring administration of the CTBS and the group mean of the summer administration of the CTBS. Statistically

significant increases were found for reading achievement of first grade students (significant at .001) and second grade students (significant at .003).

In two of the five comparisons in Table 1 an increase was found between the group mean of the spring administration of the CTBS and the group mean of the summer administration of the CTBS. Statistically significant increases were found for mathematics achievement of first grade students (significant at .063).

Table 1.

Comparison of Spring and Summer Reading and Mathematics CTBS Achievement Scores (Expanded Scale Scores) for Students Attending the 1978 Summer School Program by Level of Test Administered

Reading	Level of Test	Mathematics
* t = 6.90, sig. .001 $\bar{X}$(sp) = 253.86, σ(sp) = 30.50 $\bar{X}$(su) = 272.00, σ(su) = 27.28 n = 28	A (grade 1)	+ t = 1.94, sig. .063 $\bar{X}$(sp) = 269.14, σ(sp) = 25.05 $\bar{X}$(su) = 274.86, σ(su) = 27.35 n = 28
* t = 3.16, sig. .003 $\bar{X}$(sp) = 274.35, σ(sp) = 35.88 $\bar{X}$(su) = 286.12, σ(su) = 31.70 n = 43	B (grade 2)	t = (-0.29), sig. .775 $\bar{X}$(sp) = 298.12, σ(sp) = 38.16 $\bar{X}$(su) = 296.74, σ(su) = 30.69 n = 42
t = 0.95, sig. .345 $\bar{X}$(sp) = 352.71, σ(sp) = 39.66 $\bar{X}$(su) = 355.51, σ(su) = 42.67 n = 91	1 (grades 3&4)	t = (-0.56), sig. .578 $\bar{X}$(sp) = 354.32, σ(sp) = 34.28 $\bar{X}$(su) = 352.99, σ(su) = 35.80 n = 92
t = (-0.84), sig. .403 $\bar{X}$(sp) = 409.85, σ(sp) = 49.94 $\bar{X}$(su) = 405.62, σ(su) = 59.78 n = 55	2 (grades 5&6)	t = (-0.86), sig. .394 $\bar{X}$(sp) = 398.26, σ(sp) = 46.13 $\bar{X}$(su) = 394.65, σ(su) = 54.02 n = 54
t = 1.05, sig. .310 $\bar{X}$(sp) = 483.67, σ(sp) = 51.41 $\bar{X}$(su) = 494.83, σ(su) = 71.25 n = 17	3 (grade 7)	t = 1.47, sig. .158 $\bar{X}$(sp) = 453.05, σ(sp) = 46.16 $\bar{X}$(su) = 468.86, σ(su) = 54.66 n = 20

Research Question Three

Did boys and girls (as separate groups) enrolled in the Daviess County summer school program significantly increase their reading and mathematics achievement scores between the spring and summer (1978) administration of the CTBS?

Correlated t-tests were calculated between spring and summer reading and mathematic stanine scores for both boys and girls attending summer school. The following statistics were obtained:

Reading	Mathematics
Boys (n = 154)	Boys (n = 157)
* t = 2.46, sig. .015	t = (-0.61), sig. 0.546
$\bar{X}$(sp) = 3.79, σ(sp) = 1.26	$\bar{X}$(sp) = 4.26, σ(sp) = 1.42
$\bar{X}$(su) = 3.97, σ(su) = 1.35	$\bar{X}$(su) = 4.21, σ(su) = 1.53
Girls (n = 78)	Girls (n = 79)
t = 0.98, sig. .332	t = 1.57, sig. 0.121
$\bar{X}$(sp) = 3.73, σ(sp) = 1.02	$\bar{X}$(sp) = 4.19, σ(sp) = 1.17
$\bar{X}$(su) = 3.85, σ(su) = 1.28	$\bar{X}$(su) = 4.40, σ(su) = 1.35

The comparisons between the summer and spring reading achievement stanine scores showed an increase for both boys and girls. The increase for boys was statistically significant (significant at .015).

The comparisons between spring and summer mathematic achievement stanine scores showed an increase for girls and a decrease for boys. Neither of these comparisons were found to be statistically significant.

Research Question Four

Were the January 1979 reading and mathematic CTBS achievement scores significantly higher for students enrolled in the summer school program than for students who were invited but did not attend the program?

F statistics were computed comparing the adjusted reading and mathematic stanine scores of students attending summer school and students invited but not attending summer school. The F values were calculated

using an analysis of covariance procedure which used the January 1979 scores as the dependent variable and the spring 1978 scores as a covariate to adjust the January scores based upon initial scoring differences. The following statistics were obtained:

Reading	Mathematics
F = 1.29, sig. 0.258	+ F = 3.39, sig. 0.067
$\bar{X}$(ss) = 4.32, N(ss) = 236	$\bar{X}$(ss) = 4.84, N(ss) = 234
$\bar{X}$(nss) =4.11 , N(nss) = 58	$\bar{X}$(nss) =4.54 , N(nss) = 58

A comparison of the reading and mathematic mean January 1979 stanine scores showed that the students who attended summer school scored higher than the students who did not attend summer school. The difference in mathematic mean scores was statistically significant (significant at .067).

Research Question Five

Were the January 1979 reading and mathematic CTBS achievement scores significantly higher for students enrolled in the summer school program than for students who were invited but did not attend when data is analyzed for each level of the test administered?

F statistics were computed comparing the adjusted reading and mathematic expanded scale scores of students attending summer school and students invited but not attending summer school for each level of the test administered. The F values were calculated using the analysis of covariance procedure explained in research question four. These statistics can be found in Table 2.

In seven of the ten comparisons the mean score of the summer school students exceeded the mean score of the students invited but not attending the summer school program. The difference between means of the two groups was statistically significant for first grade students in mathematics (significant at .018).

Table 2.

Comparison of January 1979 Reading and Mathematics CTBS Scores (Expanded Scale Scores) of Students Attending Summer School and Students Invited but Not Attending Summer School by Level of Test Administered

Reading	Level of Test	Mathematics
F = 0.014, sig. .906 $\bar{X}$(ss) = 278.74, N(ss) = 28 $\bar{X}$(nss) = 280.55, N(nss) = 8	A (grade 1)	* F = 6.145, sig. .018 $\bar{X}$(ss) = 281.99, N(ss) = 28 $\bar{X}$(nss) = 264.39, N(nss) = 8
F = 1.64, sig. .215 $\bar{X}$(ss) = 311.57, N(ss) = 42 $\bar{X}$(nss) = 322.15, N(nss) = 10	B (grade 2)	F = 1.61, sig. .211 $\bar{X}$(ss) = 316.71, N(ss) = 42 $\bar{X}$(nss) = 306.45, N(nss) = 11
F = 1.03, sig. .312 $\bar{X}$(ss) = 363.50, N(ss) = 88 $\bar{X}$(nss) = 351.35, N(nss) = 16	1 (grade 3&4)	F = 0.125, sig. .722 $\bar{X}$(ss) = 364.52, N(ss) = 88 $\bar{X}$(nss) = 362.01, N(nss) = 16
F = 1.57, sig. .214 $\bar{X}$(ss) = 419.77, N(ss) = 57 $\bar{X}$(nss) = 404.26, N(nss) = 19	2 (grade 5&6)	F = 0.56, sig. .461 $\bar{X}$(ss) = 421.58, N(ss) = 56 $\bar{X}$(nss) = 413.88, N(nss) = 19
F = 0.423, sig. .522 $\bar{X}$(ss) = 482.95, N(ss) = 21 $\bar{X}$(nss) = 464.58, N(nss) = 5	3 (grade 7)	F = 0.15, sig. .703 $\bar{X}$(ss) = 480.93, N(ss) = 20 $\bar{X}$(nss) = 490.35, N(nss) = 4

Research Question Six

Were the January 1979 reading and mathematic CTBS achievement scores significantly higher for students enrolled in the summer school program than for students who were invited but did not attend when data is analyzed for boys and girls separately?

F statistics were computed comparing the adjusted reading and mathematic stanine scores of boys and girls attending summer school and boys and girls invited but not attending summer school. The F values were calculated using the analysis of covariance procedure explained in research question four. The following statistics were found:

	Reading	Mathematics
Boys		
	F = 0.77, sig. 0.380 $\bar{X}$(ss) = 4.30, N(ss) = 158 $\bar{X}$(nss) = 4.08, N(nss) = 32	F = 1.36, sig. 0.245 $\bar{X}$(ss) = 4.80, N(ss) = 157 $\bar{X}$(nss) = 4.55, N(nss) = 32
Girls		
	F = 0.68, sig. 0.413 $\bar{X}$(ss) = 4.39, N(ss) = 78 $\bar{X}$(nss) = 4.16, N(nss) = 26	+ F = 2.84, sig. 0.095 $\bar{X}$(ss) = 4.93, N(ss) = 77 $\bar{X}$(nss) = 4.52, N(nss) = 26

A comparison of the reading and mathematic mean January 1979 stanine scores for boys and girls showed that students who attended summer school scored higher than students not attending summer school. The difference in mathematic mean scores was statistically significant for girls (significant at .095).

SUMMARY

Spring and summer reading and mathematic achievement scores for students attending the 1978 Daviess County Summer School were contrasted to determine whether learning gain had taken place between April and July of 1978. Group data showed a significant increase in reading achievement scores and no significant increase in mathematic achievement scores. When data were analyzed separately for boys and girls it was found that boys had made significant reading gain whereas girls had not and that neither boys nor girls had made significant mathematic reading gain. Analyses by grade level showed significant reading gains at the first and second grade level and significant mathematic gains at the first grade level.

Reading and mathematic achievement scores of students in the summer school were contrasted to students who did not attend summer school but who were found to be similar in pretest scores and academic aptitude. The January 1979 administration of the CTBS, corrected by using the spring 1978 administration of the CTBS as a covariate, was used to compare student achievement scores. A comparison of reading means of pooled data favored the summer school students but were not statistically significant. A comparison of mathematic means of pooled data showed the summer school student to have significant higher mathematic scores. When reading data were analyzed by gender of student it was found that the summer school boys and girls had higher means than boys and girls not attending summer school although neither reading comparison was statistically significant at either the .05 level or the .10 level. When mathematic data were analyzed by gender of student it was found that the summer school boys had higher means than boys not attending summer school but that these differences were not significant at either the .05 level or the .10 level and that the comparison between groups of girls showed girls attending summer school had significantly higher mathematics scores than girls not attending summer school at the .095 level. Analyses of reading scores by grade level showed summer school students had higher means than students not attending summer school in three of the five grade level comparisons and that none of these analyses were statistically significant. Analyses of mathematic scores by grade level showed summer school students had higher mean scores than students not attending summer school in four of the five grade level comparisons and the first grade mathematic scores of students attending summer school were significantly higher than students not attending summer school.

Overall, the data appeared to indicate that initial achievement gains, as measured by a comparison of spring and summer achievement scores, were higher in reading than in mathematics and that these initial gains were higher for boys and for first and second graders. The long-term January comparison of summer school and non summer school participants appeared to indicate that summer school was most effective in mathematics particularly at the first grade level and with girls.